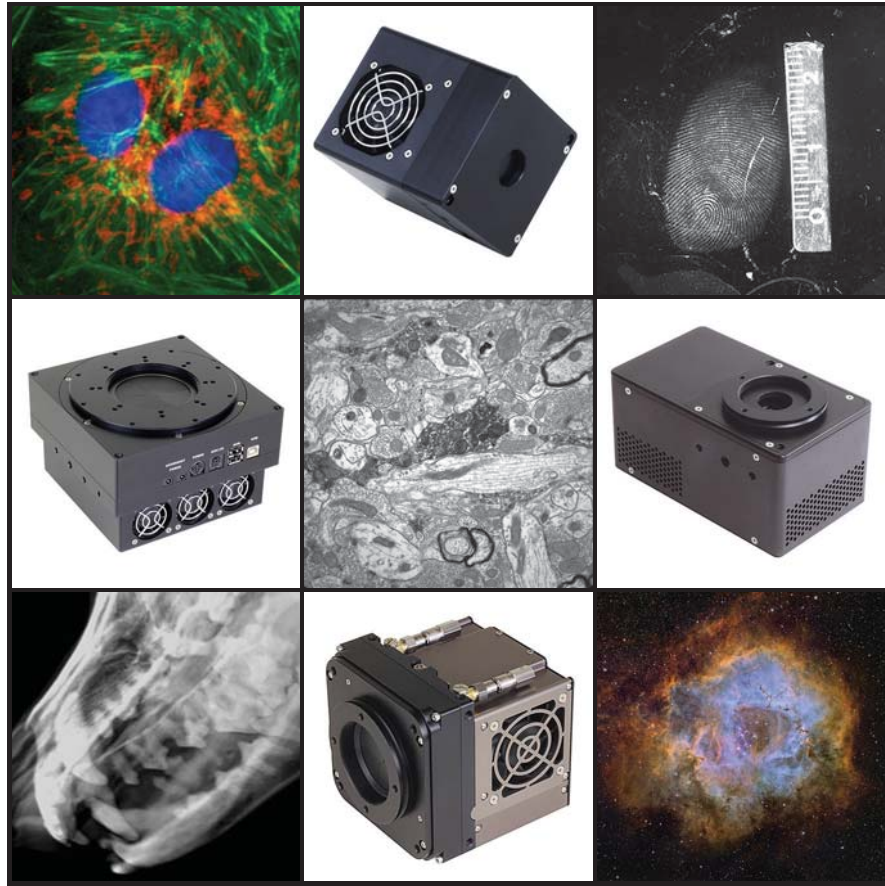




Company Overview

www.flicamera.com





Company Overview

A History of Engineering Excellence

Experience

Finger Lakes Instrumentation began designing and manufacturing cooled CCD cameras in 1998. We incorporated in 2000. Since that time we have shipped thousands of cameras to over 50 countries worldwide. A partial listing of our customers is on the back page.

Our first cameras were designed for astronomy and astrophotography, but we soon found customers in a wide range of applications, including fluorescence imaging, TEM, chemiluminescence, x-ray, forensics, and spectroscopy.

We have designed CCD cameras for more than 50 different CCDs from ON Semi, e2v, Sony, Hamamatsu, and Fairchild. We currently manufacture cameras using more than 40 different CCDs. This year we introduce our first cooled scientific CMOS cameras. We also develop best-in-class accessories for imaging, including high speed filter wheels and precision focusers.

Customers

The majority of our sales are sold to Life Science; a wide range of companies incorporate our products into their instruments. But many customers see FLI as an “astronomy camera” company. Astrophotographers take beautiful images which push the boundaries of image acquisition and processing. Such images are ideal for showing the virtues of our cameras.

Electrophoresis gels and microtiter plates are not as photogenic. In addition, companies using our cameras in their products normally want to remain anonymous.

Sensors optimized for one market quickly find homes in other applications. Eliminating channel cross-talk in a multi-channel astronomy camera benefits life scientists using the same sensor. Increasing frame rate for life scientists benefits astronomers who want to get the most from good observing conditions.

Markets

Every FLI product is designed and manufactured in New York, USA. The majority of our products however are exported! We supply to OEMs in North America, Asia, the Middle East, and Europe. Our customers have the confidence to install our products in remote automated observatories from Finland to the equator to Antarctica, all around the globe.

FLI is ready to assist you with your camera requirements whether you need hundreds of cameras with consistent batch to batch performance or a single camera optimized for a unique application.

FLI is a registered trademark of Finger Lakes Instrumentation LLC.



Pulkova Observatory in Russia
Home to several ProLine Cameras

Cooled CCD Cameras

ProLine, MicroLine, Hyperion and Cobalt



ProLine

ProLine cameras offer the deepest cooling of our standard cameras, and provide two power and two USB connections for FLI accessories. A complete imaging system (camera, filter wheel and focuser) can be controlled with a single power and USB cable from your PC. High and low data rates are optimized using independent analog to digital converters. Both the inner and outer chambers are sealed for harsh environments.



MicroLine

MicroLine cameras cover a broad range of possibilities, from small interline transfer sensors with a C-mount front flange to the massive 50-megapixel ML50100. Despite being smaller and lighter than ProLine cameras, MicroLines cool within a few degrees of their larger sibling, and substantially deeper than competitive models. Smaller sensors have a shorter back focal distance than ProLine cameras. MicroLines support dual and quad channel readout with some sensors.



Hyperion

The Hyperion camera was developed to satisfy a single customer's need for MicroLine performance in a package shorter from front to back. Since that time, demand for Hyperion cameras has grown to rival the MicroLines. Based on the same electronics as the MicroLines, Hyperions are similar in performance. Hyperions do not support large shutters (63.5 and 65mm).



Cobalt

Designed for large sensors and high powered cooling requirements, the Cobalt DC4320 is based on the ON Semi KAF-4320 (2K x 2K, 24 micron pixels) sensor. Contact FLI to order.

Coming soon: e2v's back-illuminated CCD230-84 (4K x 4K, 15 micron pixels).

Every Cobalt camera includes our 4-point sensor tilt control system. The Optical Correction System (OCS) compensates for sensor packaging tolerances and/or optical path tilt, ensuring that your optics are never tilted relative to the camera's large sensor.





Cooled CCD Cameras

Select from over 40 different sensors

Astronomers prefer large-format, high-QE sensors such as the back-illuminated e2v CCD230-42 and CCD42-40, as well as the cost effective KAF-16803 and KAF-09000. Back-illuminated sensors are available with a variety of coatings optimized for visible, UV, or near IR imaging.

KAF-50100 with microlensed sensor

In 2015, FLI partnered with ON Semiconductor (Kodak) to develop a high QE version of the 50 megapixel KAF-50100 sensor. The project netted a high resolution sensor with 2.5x its original QE. The 8176 x 6132 array with 6 micron pixels now has better sensitivity than its much smaller cousin, the KAF-8300.

ML16200

The newest member of the FLI family, the KAF-16200 fills the gap between the KAF-8300 and the KAF-16803. Customers are giving us rave reviews of its clean, uncalibrated images. Typical system noise 5.5 electrons.

PL23042 Single channel ML23042 Four channel

For the ultimate in performance, this 2048 x 2048 back-illuminated CCD with 15 micron pixels has low-noise 16-bit readout at 500 kHz and 1.5 MHz (PL) / 2 MHz (ML) (software selectable). The three-stage TEC cools the sensor to 60°C below ambient.

ProLine PL16803 MicroLine ML16803

This camera features a 4096 X 4096 array with 9 micron pixels and a peak QE of 59%. Low noise digitization to 16 bits at both 1 MHz and 8 MHz (software selectable). The 3-stage TEC cools the sensor to 60C below ambient in the ProLine.

Life scientists tend to order small format, low noise interline transfer CCDs such as the Sony ICX695 and the ON Semi KAI-08051.

MicroLine MLx695

Read noise as low as 3 electrons!

Six megapixel Sony sensor has exceptionally low noise and high quantum efficiency. Small pixels (4.54 micron) are a good fit for microscopy and short focal length scopes. Lightweight camera head with a short back focal distance (17.5mm). FLI's 3-stage cooler drops the CCD to 50C below ambient, with dark current so low it's hard to measure.

MicroLine ML8051

Read noise as low as 3.5 electrons!

More and more OEM customers are moving up from the KAI-2020 and KAI-4022 to this eight megapixel interline sensor with exceptionally low noise and twice the area of the ICX695.



The PL16803 is the finest KAF-16803-based camera available.

Cooled Scientific CMOS Cameras

The Ultimate in Sensitivity and Speed



The KL400 and KL4040 scientific CMOS cameras represent the first release in a new family of cooled scientific CMOS cameras from FLI. These cameras provide high sensitivity, low noise, and high speed, all at game-changing combinations of performance and price.

KL400 BI: The Ultimate in Sensitivity

The KL400's back-illuminated sensor has a peak quantum efficiency of 95%, making it one of the most sensitive cameras on the market. The camera can reach video rates at full resolution with as little as 1.6 electrons RMS of noise.

KL4040: Large Area and High Speed

The KL4040 is a large format cooled sCMOS camera with high-sensitivity, low-noise, and fast frame rates; opening up a new world of imaging possibilities. The KL4040 provides higher SNR images than the PL16803 even with a single long exposure! The KL4040 also allows a user to stack multiple short exposures with better results (higher SNR) than possible with a CCD camera.

	KL400 BI	KL4040
Shutter	Rolling	Rolling; Rolling with Global Shutter
Resolution	2048 x 2048	4096 x 4096
Pixel size	11 microns	9 microns
Imaging area	22.5 mm x 22.5 mm	36.9 mm x 36.9 mm
Linear full well capacity	92K e-	70K e-
Read noise (RMS)	1.6 e-	3.7 e- at 24 fps
Maximum Frame Rate	48 fps	24 fps
Interface	USB 3.0, optional QSFP fiber	USB 3.0, optional QFSP fiber
Peak QE	95%	74%



Air Cooled (Liquid Cooling optional)
Also available: KL400 FI front-illuminated



Kepler KL4040



Filter Wheels and Focusers

Leading Edge Accessories

CFW Filter Wheels



CenterLine Filter Wheels



Atlas Focuser



FLI has developed filter wheels accepting a broad range of filter sizes and positions. Our color filter wheels' robust mechanical designs provide the basis for stunning, uncompromising images. Each FLI color filter wheel is precision engineered with a highly accurate no-slip drive chain and stepper motor. The large diameter pivot pin and bushings are precision ground and matched for smooth, quiet no-fuss operation. FLI color filter wheels do not use internal lights for homing, so your images are protected from stray light interference.

CenterLine color filter wheels have two overlapping filter carousels with a central aperture. Symmetrical weight distribution eliminates changes in the telescope's balance as it tracks across the sky. CenterLines are also ideal for prime focus installations where a symmetric location over the secondary mirror is beneficial. The CL-1-10 has two 5 position carousels for 50 mm square filters, ideal for the PL16803. The CL-1-14 has two 7-position carousels for 50 mm diameter filters; the CL-1-20 has two 10-position carousels for 25 mm

To satisfy the demand for high precision focusing on telescopes with heavy loads, FLI developed the Atlas focuser. The Atlas is the finest available focuser for large sensors: 105,000 steps with 85 nm per step. The Atlas's precision drive screws guarantee superior positional accuracy and repeatability in any orientation. Custom linear bearings provide extreme torsional rigidity. The Zero Tilt Adapter™ ensures no tilt, tip, or marred surfaces.

The ZTA™ is an FLI adapter design that eliminates the common deficiencies found in most astronomical adapters. When you use the ZTA™ you will never experience tilted components, marred adapters, or wobbly interfaces!

The ZTA™ adapter system employs a circular spring that evenly distributes the pressure of three set screws against the ZTA™ dovetailed surface. The resulting clamping force between the two machined surfaces results in zero tilt, zero adapter marring and a complete elimination of problems associated with loose connections. The ZTA™ adapter can be machined to fit nearly any type of camera, color filter wheel or telescope.

ZTA™ - featured in the Atlas focuser and the CenterLine color filter wheel.

ZTA is a registered trademark of Finger Lakes Instrumentation LLC.

High Speed Accessories for Microscopy

Industry-Leading Filter Exchange Times



Some applications require rapid change of filters in order to observe different spectral ranges as close together in time as possible. FLI's high speed filter changers represent a major leap forward in speed and ease of use. Optimized hardware cuts filter wheel move times in half even with a fully loaded wheel. Software does not need to be manually "tuned" to the number of filters or their locations. The compact units connect directly to the host computer via USB (no bulky external controller needed) and up to three can be daisy-chained from a single computer port.

- Filter wheels 2X-3X higher throughput than competitors' units
- Cube turret 10X higher throughput
- Exceptional reliability
- Automatic adjustment for filter distribution
- Easy OEM integration
- No external controller needed
- Major software program support
- Optional external shutter driven from auxiliary port
- Optional reflection reducing angled filter pockets

Servo Motors for Speed

High performance brushless servo motors are more efficient than the stepper motors used in other systems. FLI's high speed filter switchers use state-of-the-art semiconductor components, a high performance digital signal processor (DSP), and a sophisticated control algorithm. This control system continuously monitors the position of the wheel and adjusts the amount of torque delivered by the motor to get maximum speed with minimum vibration. When filters are added or removed, the controller automatically adapts to changes in load.

Servo Motors for Reliability

Encoder feedback provides more reliable positioning than open-loop stepper motors that can sometimes skip steps. In terms of usable lifetime, a HSFW continuously running at FLI has completed 250 million operations without a problem.



The compact HSFWs do not require an external controller.

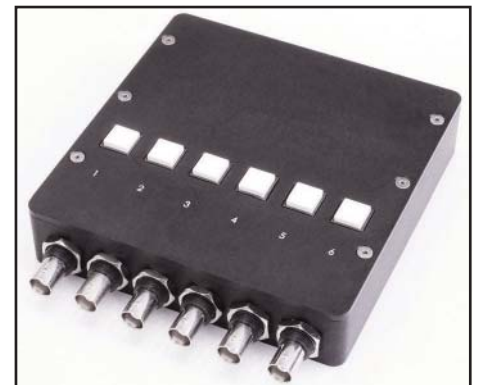
Contact FLI with your customization needs.



HS625 on Stand



High Speed Filter Switcher for Nikon Inverted Microscope



Optional Hand Controller for HS625

Finger Lakes Instrumentation LLC
www.flicamera.com · 1250 Rochester St. · Lima NY 14485 USA · 585-624-3760

©2018 Finger Lakes Instrumentation LLC



FLI Customers

www.flicamera.com

Aarhus University (Denmark) · Abastumani Observatory (Georgia) · Academia Sinica (China) · Adiyaman University (Turkey) · Adler Planetarium · Aerospace Corporation · Aiglon College (Switzerland) · Air Force Research Laboratory · Aix Marseille Université (France) · American Museum of Natural History · Anadolu University (Turkey) · Andor Technology (UK) · Andrushivka Observatory (Ukraine) · Appalachian State University · Argonne National Lab · Arizona State University · Artem Observatory (Russia) · Auburn University · Austin College · Australian Astronomical Observatory · Australian Defence Science & Technology Organisation (DSTO) · Australian National University · Azdeniz University (Turkey) · Baader Planetarium (Germany) · Baku State University (Azerbaijan) · Ball Aerospace · Ball State University · Beijing Institute of Technology (China) · Beijing University (China) · Binghamton University · Boeing · Boston University · Brigham Young University · Bryn Mawr College · Butler University · California Institute of Technology · Carl Zeiss Jena · Carlton University (Canada) · Carnegie Institution for Science · Carnegie Observatories · Catholic University of America · Centro de Estudios de Física del Cosmos de Aragón (Spain) · Center for Research and Advanced Studies of IPN (Mexico) · Charité - Universitätsmedizin Berlin (Germany) · China Academy of Space Technology · CICESE (Mexico) · City College of New York · Civil Aviation University (China) · Colby College · Connecticut College · Colgate University · Colleparado Observatory (Italy) · Colorado State University · Columbia University · Copernicus Foundation for Polish Astronomy · Cornell University · CSIR - Council for Scientific and Industrial Research (South Africa) · Cukurova University (Turkey) · Dartmouth College · DESY Deutsches Elektronen Synchrotron (Germany) · Drexel University · Duquesne University · Durham University (UK) · Edmund Optics · Embry-Riddle Aeronautical University · Emirates Mobile Observatory (Abu Dhabi) · Emory University · EOS (Australia) · ETH Zürich (Switzerland) · European Molecular Biology Laboratory (Germany) · European Neuroscience Institute · European Southern Observatory (Germany) · Exelis · Food & Drug Administration · Florida International University · Fordham University · Freie Universität Berlin (Germany) · Fudan University (China) · Geneva Observatory (Switzerland) · George Washington University · Georgia Institute of Technology · Georgia Public Health Lab · GEOST · Getty Museum · Gissar Observatory (Tajikistan) · Goodrich · Guang Xi University (China) · Harvard University · Hefei Institute (China) · Helmholtz Centrum Geesthacht (Germany) · Hitachi · Horiba · Howard Hughes Medical Institute · Humboldt University of Berlin (Germany) · Institute of Molecular and Cell Biology (Singapore) · Institut d'Astrophysique de l'Université de Liège (Belgium) · Institut de Planetologie et Astrophysique de Grenoble (France) · Institute of Astronomy, Hawaii · Institute of Fluid Physics (China) · Institute of Mechanics, Chinese Academy of Sciences (CAS) · Institute of Physics (CAS) · Instituto de Astrofísica de Andalucía (Spain) · Instituto de Astrofísica de Canarias (Spain) · Instituto de Astronomía, UNAM (México) · Instituto de Estudios Espaciales de Cataluña (Spain) · IPICYT (Mexico) · ITT Space Systems · IUCAA Pune University (India) · Jagellonian University (Poland) · Japan Aerospace Exploration Agency (JAXA) · Jenoptik · Jet Propulsion Laboratory · Johns Hopkins University · Karlsruhe Institute of Technology (Germany) · Kitab Observatory (Uzbekistan) · Konkoly Observatory (Hungary) · Kopernik Observatory and Science Center · Korea Astronomy and Space Science Institute (KASSI) · Krasnojarsk Observatory (Russia) · Langkawi National Observatory (Malaysia) · Las Campanas Observatory (Chile) · Las Cumbres Observatory Global Telescope Network · Lawrence Berkeley Lab · Lawrence Livermore National Laboratory · LG Electronics (South Korea) · Lick Observatory · Leibniz Institute for Plasma Science (Germany) · Lockheed Martin · Lohrman Observatory (Germany) · Los Alamos National Laboratory · Lowell Observatory · Macquarie University (Australia) · Maidanak Observatory (Uzbekistan) · Marine Biological Laboratory · Mauna Kea Observatory · Max Planck Institute (Germany) · Mayaki Observatory (Ukraine) · Mayo Clinic · McDonald Observatory · Memorial University of Newfoundland (Canada) · Miami University · Middlebury College · Milkovo Observatory (Russia) · Mississippi State University · MIT · MIT Lincoln Laboratory · Mondy Observatory (Russia) · Montana State University · Mt. Sinai School of Medicine · NASA Ames · NASA Goddard · NASA Johnson · National Astronomical Observatories of China · National Astronomical Research Institute of Thailand/NARIT · National Institute of Aeronautics and Space (Indonesia) · National Institute of Health · National Renewable Energy Laboratory · National Taiwan University · National University of Ireland · Nauchnyy Observatory (Ukraine) · Naval Ordnance Test Unit · Naval Research Laboratory · New Mexico State University · New Mexico Tech · New York State Dept. of Health · New York University · Nikon · NIST · Northrop Grumman · Northwestern Polytechnical University (China) · Northwestern University · Novosibirsk State University (Russia) · Observatoire de Oukaimeden (Morocco) · Observatorio Astronómico Nacional (Bolivia) · Observatory Hamburg (Germany) · Olympus · Oxford University (UK) · Palomar Observatory · Paul Scherrer Institute (Switzerland) · Peace Parks (South Africa) · Pennsylvania State University · Physical Research Lab (India) · Pontificia Universidad Católica de Chile · Princeton University · Pulkova Observatory (Russia) · Purdue University · Purple Mountain Observatory (China) · Qatar Foundation · Raytheon · Reial Acadèmia de Ciències i Arts de Barcelona (Spain) · Rheinisch-Westfälische Technische Hochschule (Germany) · Rochester Institute of Technology · Rose-Hulman Institute of Technology · Royal Melbourne Institute of Technology (Australia) · Sandia National Laboratories · Sanglok Observatory (Tajikistan) · Scripps Research Institute · Seoul National University (South Korea) · SETI Institute · Shan Dong University (China) · Shanghai Institute of Technical Physics (China) · Shanghai Observatory (China) · Shumen University (Bulgaria) · Siding Spring Observatory (Australia) · Siemens · Simon Fraser University (Canada) · SLAC National Accelerator Laboratory · South African Large Telescope (SALT) · St. Francis Xavier University (Canada) · Stanford University · STFC (UK) · SUNY · Sydney University (Australia) · Tarleton University · Technical Universities of Darmstadt, Dresden, and Ilmenau (Germany) · Technion University (Israel) · Tel Aviv University (Israel) · Tenagra Observatories · Terskol Observatory (Russia) · Texas A&M University · Texas State University · The Ohio State University · Tiraspol Observatory (Moldova) · Tubitak National Observatory (Turkey) · Turksat University (Turkey) · Tuskegee University · Universidad Nacional Autónoma de México · Universidad Nacional de La Plata (Argentina) · Università di Roma (Italy) · Universität de Barcelona (Spain) · Universität de Valencia (Spain) · Université de Montréal (Canada) · Universiteit Leiden (Netherlands) · Universities of Alabama, Alaska, Arizona, California, Central Florida, Chicago, Hawaii, Illinois, Iowa, Kentucky, Maryland, Massachusetts, Minnesota, Nevada, New Mexico, North Carolina, North Dakota, Notre Dame, Pittsburgh, Rochester, South Carolina, Texas, Virginia, Washington, and Wisconsin · Universities of Bremen, Duisburg, Freiburg, Göttingen, Heidelberg, Kiel, Konstanz, Magdeburg, Potsdam, and Würzburg (Germany) · University College Dublin (Ireland) · University Observatory Munich (Germany) · University of Bern (Switzerland) · University of Bradford (UK) · University of Calgary (Canada) · University of Dresden (Germany) · University of Jena (Germany) · University of Lethbridge (Canada) · University of Munich (Germany) · University of the Pacific · University of Quebec at Montreal, UQAM (Canada) · University of Newcastle (UK) · University of Queensland (Australia) · University of Rome (Italy) · University of Toronto (Canada) · University of Vienna (Austria) · University of the Virgin Islands · University of Warwick (UK) · University of Western Australia · University of Western Ontario (Canada) · Upice Observatory (Czech Republic) · UPJS Institute of Physics (Slovakia) · US National Park Service · Ussurijsk Observatory (Russia) · Utah State University · Uzhgorod Observatory (Ukraine) · VA Hospital San Francisco · Victoria University of Wellington (New Zealand) · Virginia Tech · Washington and Lee University · Washington University in St. Louis · Wayne State University · Wellesley College · Western Kentucky University · Wheaton College · Whitehead Institute of Biomedical Research · Whitman College · Williams College · Xi'an Institute of Optics and Precision Mechanics of CAS (XIOPM) · Xi'an University of Technology (China) · Xidian University (China) · Yale University · YBJ Observatory (Tibet) · Yunnan Observatory (China) · Zvenigorod Observatory (Russia)